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The effect of undergraduate education on pain-related attitudes and beliefs in healthcare students

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Abstract

Objective:

To investigate: (1) the differences in attitudes and beliefs towards persistent pain management between first- and final-year undergraduate healthcare students and (2) the magnitude of change across disciplines.

Methods:

Online cross-sectional questionnaires of first- and final-year adult, child and mental health nursing, occupational therapy, physiotherapy and podiatry students at Glasgow Caledonian University. Scores from the Health Care Providers' Pain and Impairment Relationship Scale (HC-PAIRS) and the Back Beliefs Questionnaire (BBQ) were analysed with independent t-tests and a two-way analysis of variance.

Results:

Completed questionnaires were analysed (HC-PAIRS n=177; BBQ n=173). Mean HC-PAIRS scores in final-year mental health nursing (65.08) and physiotherapy students (55.64) indicated significantly more evidence-based beliefs than first-year students (72.17, p=.029 and 65.75, p<.001 respectively). Similarly, final-year physiotherapy students mean score on the BBQ was greater than their first-year peers (34.06 versus 27.96, p<.001). HC-PAIRS scores were found to be significantly different between the courses, ($F(5,165)=3.69$ $p=.003$ $\eta_p^2=.101$) and years ($F(1,165)=6.71$ $p=.010$ $\eta_p^2=.039$). This main effect of Course, ($F(5,161)=2.72$ $p=.022$ $\eta_p^2=.078$) and Year, ($F(1,161)=5.20$ $p=.024$ $\eta_p^2=.031$) was also observed for the BBQ. However, the Course x Year interaction only reached statistical significance for the BBQ ($F(5,161)=2.44$ $p=.036$ $\eta_p^2=.071$). No differences were observed in questionnaire scores for the other students included in the study.

Conclusion:

Final-year healthcare students appear to have more positive attitudes and beliefs towards persistent pain management than first-year students, suggesting that undergraduate education may have a positive influence on pain-related attitudes and beliefs. Specific disciplines or courses seem to be associated with greater improvements than others. The curriculum employed in these courses could be investigated as a way to enhance pain-related education. However, further research is required to explore the best way to improve pain-related attitudes and beliefs in undergraduate healthcare students.

Key Words: Pain; Education; Management; Students; Healthcare professionals.

Introduction

Estimates suggest that over 20% of the world population is currently affected by persistent musculoskeletal pain, resulting in a significant economic, social and societal burden [1,2]. Persistent musculoskeletal pain is defined as pain that persists beyond normal healing time, therefore not fulfilling its primary purpose of protection [3]. Over time, several adaptations occur such as sensitization of neurones in peripheral and central systems, neuro-plastic changes within the brain or psychosocial consequences (e.g. depression) [4,5]. Based on its increasing prevalence, access to high-quality pain management was recognised as a fundamental human right by the International Association for the Study of Pain [6].

An in-depth understanding of the multifactorial components contributing to the pain experience is required for effective pain management [7]. However, there is evidence demonstrating that the level of pain education in undergraduate healthcare courses is sub-optimal [3,6]. The lack of adequate undergraduate pain-related education may be a key contributing factor with qualified clinicians reporting low confidence in their ability to meaningfully implement the biopsychosocial model and to efficiently manage persistent pain [8-10].

Two recent systematic reviews demonstrated the influence of clinicians' attitudes and beliefs on their approach to the management of chronic low back pain [11,12]. These reviews reported strong evidence that healthcare providers beliefs are associated with the beliefs of their patients, and moderate evidence that beliefs influence treatments and recommendations provided [11,12]. Healthcare professionals with a biomedical orientation have a lower adherence to evidence-based guidelines, which is likely to result in poorer treatment outcomes [12]. Biomedical-focussed beliefs revolve around finding a solely biomedical origin to pain, rather than acknowledge its multifactorial aspect. Current guidelines advocate the use of a biopsychosocial approach, as treatment outcomes have been shown to be strongly influenced by a complex, unique and evolving combination of biological, psychological and social factors [13-16]. The biopsychosocial model includes these factors in the understanding and management of persistent pain [17]. Furthermore, evidence suggests that a biopsychosocial approach significantly improves quality of life in persistent pain patients, by reducing levels of pain, promoting the integration of helpful coping strategies and leading to higher levels of activity [7,18-20]. This could suggest that positively influencing attitudes and beliefs of healthcare professionals may improve pain management.

It could be argued that undergraduate education has the potential to shape the future of healthcare through the development of adequate curriculum. Several studies already suggest that undergraduate education may influence pain-related attitudes and beliefs in healthcare students [21-23]. Final-year students will become newly-qualified professionals with minimal amount of further training; it is therefore important to understand the influence that undergraduate education could have on the behaviour of future clinicians. In the context of this study, the terms "more positive" and "improved" pain-related attitudes and beliefs refer to a shift towards an evidence-based biopsychosocial approach to persistent pain management.

The aim of this study is therefore to investigate the attitudes and beliefs of undergraduate healthcare students towards persistent pain and explore any differences across courses and between first- and final-year students.

Methods

Design

In this cross-sectional study, the attitudes and beliefs of first- and final-year undergraduate healthcare students were collected using an online survey composed of two questionnaires. The results of first- and final-year students were compared within their course. The magnitude of change between years was then compared across the disciplines. Ethical approval for this study was obtained from the Glasgow Caledonian University School of Health and Life Sciences Ethics Committee. All participants provided written informed consent through the online survey before taking part in the study. This study is reported according to the Strengthening the Reporting of Observational Studies in Epidemiology checklist (Appendix 1).

Participants

An invitation to join the study was emailed to first- and final-year undergraduate adult, child, mental health and learning disability nursing, occupational therapy, physiotherapy and podiatry students (n=1474; Appendix 2) at Glasgow Caledonian University. The inclusion criteria consisted of being in either the first or last year of study and having a minimum of ten respondents per course. Questionnaires with missing data were excluded from the analysis. Due to the low responses from learning disability nursing students (n=2), their results were

not included in the analysis. No specific demographic data were collected in addition to study level and course. A power analysis was conducted prior to sending the questionnaires; in order for the study to be powered at 80% (alpha set at .05), a minimum of 315 participants was needed. Despite being underpowered [24], the sample size was comparable to previous studies with similar design and population [21,22,25-27].

Outcome Measures

Two questionnaires were used as primary outcome measures: Health Care Providers' Pain and Impairment Relationship Scale (HC-PAIRS) and Back Beliefs Questionnaire (BBQ).

The HC-PAIRS is a questionnaire assessing the attitudes and beliefs of healthcare providers about the relationship between pain and function in patients with chronic low back pain [28]. A lower score generally indicates a more positive attitude towards function in patients with persistent pain. The total score is based on 15 statements, each scored by a seven-point Likert scale, ranging from "completely disagree" (1) to "completely agree" (7).

The HC-PAIRS questionnaire has demonstrated good to high level of internal consistency (Cronbach's alpha =0.78-0.92); it has already been used in healthcare student populations (Appendix 3) and is responsive to change [28-30]. The HC-PAIRS score seems to correlate with and be a good predictor of clinicians' recommendations concerning work and activity, for patients with low back pain [29].

The BBQ explores the beliefs held about inevitable consequences of low back pain; a higher score generally indicates more positive beliefs about low back pain [31]. A five-point Likert scale is used to score each item (total disagreement=1, total agreement=5); the total of the nine essential items is then calculated.

Satisfactory to good level of internal consistency has been demonstrated (Cronbach's alpha =0.70-0.75), combined with an adequate test re-test reliability (intra-class correlation coefficient=0.87) [31,2]. It has already been used amongst healthcare students (Appendix 4). Furthermore, it demonstrates a strong construct validity [33].

Data Analysis

The normality of the collected HC-PAIRS and BBQ scores was assessed using a Shapiro-Wilk test. Overall, the scores were normally distributed across the courses studied and the year of study. Only one course (physiotherapy) demonstrated a non-parametric distribution for BBQ scores (Shapiro-Wilk p=0.46), which was due to the presence of one outlier (included in the analysis). Two main statistical analyses were performed. The first analysis compared the scores of first- and final-year students, within their respective course. Based on the parametric presentation of the majority of the results, independent t-tests were used. For the second analysis, a two-way analysis of variance (ANOVA) was used, with the level of study (Year) and the course studied (Course) set as independent variables. Post-hoc analysis was performed using Bonferroni's test to control for Type I error, corroborated by Gabriel's pairwise test procedure based on the differences in sample size across the groups. Additionally, the partial eta squared (η_p^2) was used to evaluate the proportion of variance that a variable explains, and that is not explained by the other variables analysed. The η_p^2 was selected based on the two-way ANOVA design. A p-value lower than .05 was considered statistically significant. The Statistical Package for the Social Sciences Version 24.0.0.2 (IBM Corp., Armonk, NY, USA) was used for data analysis.

Results

Participants

One hundred and seventy-seven students completed at least one questionnaire fully (Table 1). Only completed questionnaires were analysed, resulting in slightly different sample sizes between the HC-PAIRS (n=177) and the BBQ (n=173). These small disparities could be attributed to the response fatigue phenomenon [34].

Table 1: Number of participants by questionnaire response, year of study and course

	HC-PAIRS			BBQ		
Participants	First Year	Final Year	Total	First Year	Final Year	Total
Adult Nursing	6	13	20 (3%)	7	12	19 (3%)
Child Nursing	8	15	23 (12%)	8	13	21 (11%)
Mental Health Nursing	12	12	24 (17%)	12	12	24 (17%)
Occupational Therapy	13	27	40 (33%)	13	27	40 (33%)
Physiotherapy	24	36	60 (65%)	23	36	59 (63%)
Podiatry	4	7	11 (17%)	4	6	10 (15%)
Pooled	67	110	177	67	106	173

HC-PAIRS = Health Care Providers' Pain and Impairment Relationship Scale; BBQ = Back Beliefs Questionnaire. Percentages represent the response rate based on the total population reached (i.e. first- and final-year students), per course and questionnaire.

HC-PAIRS

The mean HC-PAIRS score of all participants was 67.60 (first-year; standard deviation [SD] =9.571) and 61.85 (final-year; SD=10.345); no statistically significant difference in HC-PAIRS scores was observed between first-year students (Figure 1). On average, final-year mental health nursing students scored significantly lower (i.e. demonstrated more positive beliefs) compared to first-year mental health nursing students (t(22)=2.33, p=.029; Table 2). Additionally, the final-year physiotherapy students performed significantly better than first-year physiotherapy students (t(58)=3.97, p<.001). No significant difference was observed between first- and final-year students from the other courses.

The ANOVA revealed that there was a significant main effect of the course on the mean HC-PAIRS scores (F(5,165) =3.69, p=.003, η_p^2 =.101). More precisely, Bonferroni post-hoc test and Gabriel's pairwise test procedure revealed that, overall, physiotherapy students scored significantly lower than mental health nursing (p=.002 and p=.002 [Bonferroni and Gabriel's pairwise tests respectively]) and podiatry (p=.042; p=.020) students. Additionally, HC-PAIRS results were overall more positive in final-year students than in first-year students (F(1,165)=6.71, p=.010, η_p^2 =.039) (Table 2; Figure 1). Interestingly, the magnitude of change did not differ between the courses, based on the non-significant interaction effect observed (F(5,165)=1.26, p=.290, η_p^2 =.036).

Table 2: Descriptive statistics for the HC-PAIRS

	First Year		**Final Year**		**Differences**	
Score	Mean	SD	Mean	SD	MD	95% CI
Adult Nursing	64.00	7.668	63.62	9.500	.385	- 8.987; 9.757
Child Nursing	67.38	9.620	65.93	14.180	1.442	-10.250; 13.133
MH Nursing[a]	72.17	7.056	65.08	7.821	7.083	.777; 13.390
OT	67.15	8.999	64.15	7.710	3.006	-2.556; 8.568
Physio[b]	65.75	11.399	55.64	8.350	10.111	5.008; 15.215
Podiatry	72.25	5.679	67.43	12.541	4.821	-10.424; 20.067
Pooled[c]	67.60	9.571	61.85	10.345	5.742	2.665; 8.819

[a] significant difference, p= .029; [b] significant difference, p< .001; [c] significant difference, p< .001. SD = Standard Deviation; MD = Mean Difference between first- and final-year students; 95% CI = Confidence Interval of the Difference; MH Nursing = Mental Health Nursing; OT = Occupational Therapy; Physio = Physiotherapy

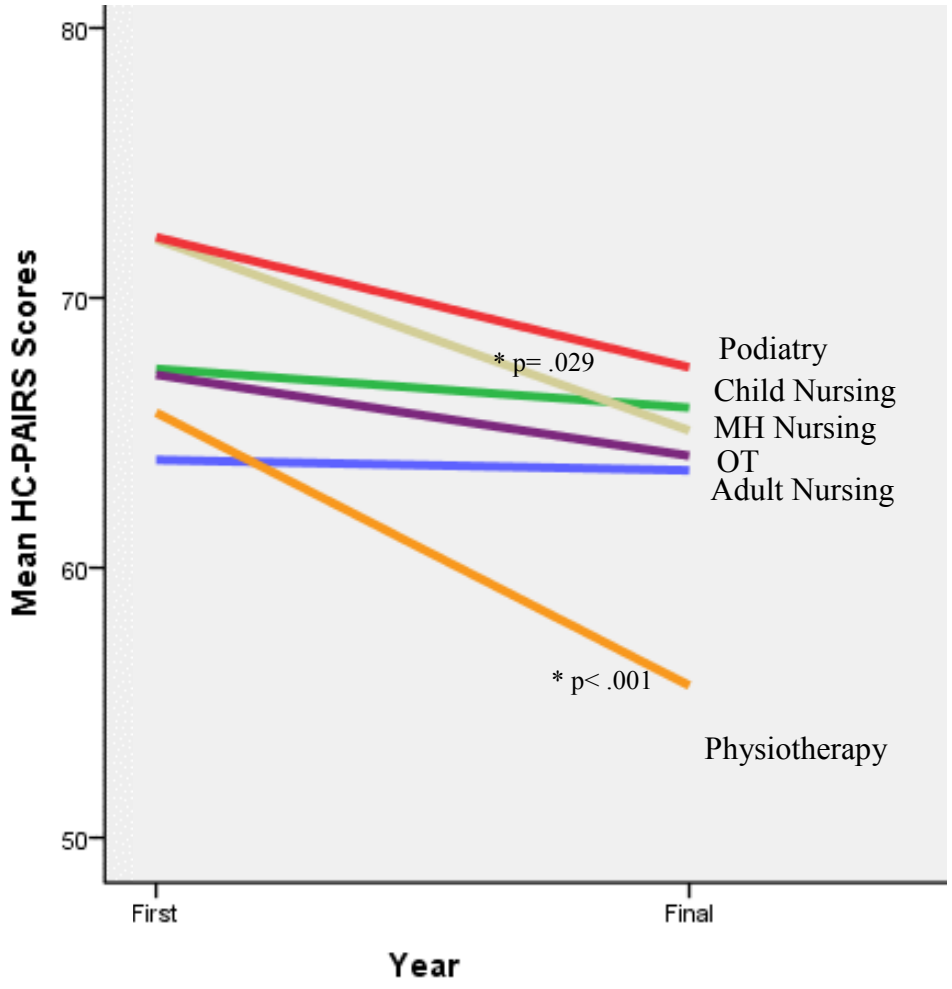

Figure 1: Mean HC-PAIRS scores across all students in first and final years. * indicates significant difference via independent t-test.

BBQ

The mean BBQ score of all the participants was 27.72 for first-year (SD=5.421) and 30.41 for final-year (SD=5.482). No statistically significant difference in BBQ scores was observed between first-year students (Figure 2). Overall, final-year physiotherapy students demonstrated significantly more positive beliefs than their first-year peers (t(57)=-4.47, p<.001; Table 3). No further statistically significant difference was observed across the remaining courses.

The course studied had a significant main effect on the BBQ score (F(5,161)=2.72, p=.022, η_p^2 =.078). Bonferroni post-hoc test and Gabriel's pairwise test procedure revealed that, overall, physiotherapy students scored significantly better than child nursing (p=.007 and p=.004 [Bonferroni and Gabriel's pairwise tests respectively]) and occupational therapy (p=.030; p=.028) students. Overall, the questionnaire results were significantly more positive in final-year than in first-year students (F(1,161)=5.20, p=.024, η_p^2 =.031) and the magnitude of change varied significantly across the courses (Course x Year interaction, F(5,161)=2.44, p=.036, η_p^2 =.071).

Table 3: Descriptive statistics for the BBQ

	First Year		**Final Year**		**Differences**	
Score	Mean	SD	Mean	SD	MD	95% CI
Adult Nursing	26.86	4.598	29.58	4.055	-2.726	-6.996; 1.543
Child Nursing	27.13	1.738	26.92	4.536	.202	-6.118; 6.521
MH Nursing	28.83	9.342	27.50	5.266	1.333	-2.641; 5.307
OT	27.46	3.303	28.81	4.608	-1.353	-4.452; 1.745
Physio[a]	27.96	4.041	34.06	4.696	-6.099	-8.835; -3.363
Podiatry	26.50	1.167	30.67	7.528	-4.167	-13.644; 5.311
Pooled[b]	27.72	5.421	30.41	5.482	-2.689	-4.371; -1.008

[a] significant difference, p< .001; [b] significant difference, p= .002. SD = Standard Deviation; MD = Mean Difference between first- and final-year students; 95% CI = Confidence Interval of the Difference; MH Nursing = Mental Health Nursing; OT = Occupational Therapy; Physio = Physiotherapy

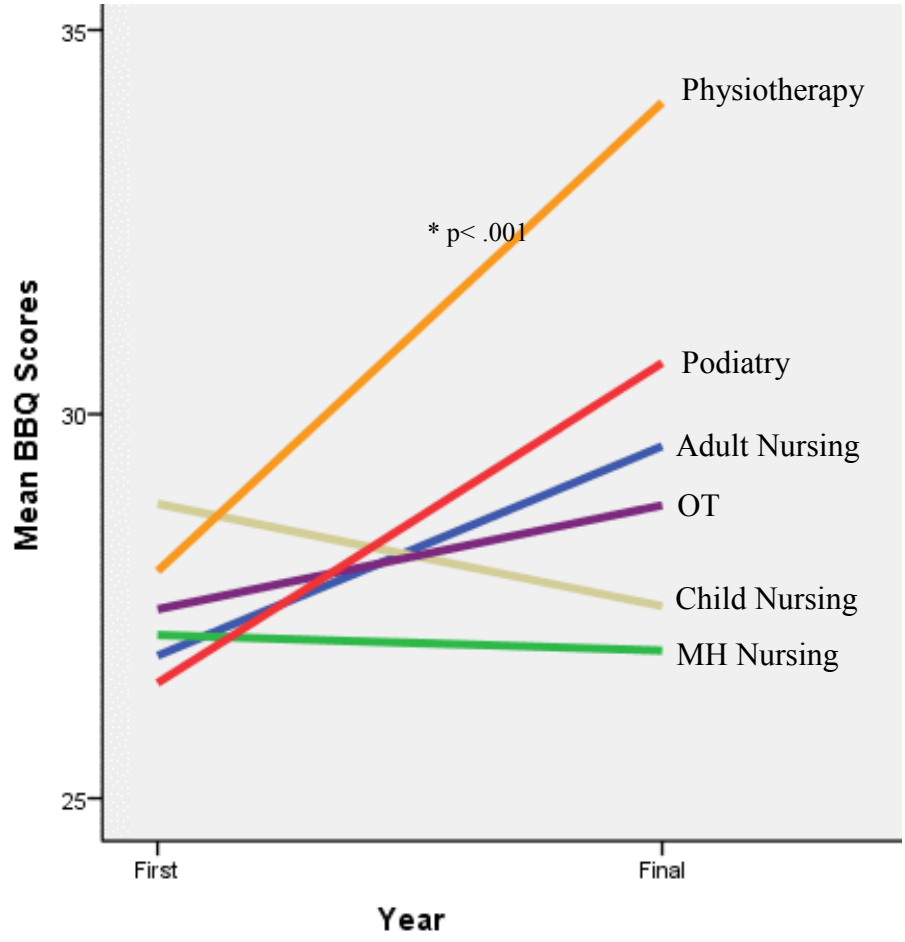

Figure 2: Mean BBQ scores across all students in first and final years. * indicates significant difference via independent t-test.

Discussion

The aims of this study were to compare the attitudes and beliefs of undergraduate healthcare students towards persistent pain and explore any differences across courses and between first- and final-year students. This is the first study to examine six different undergraduate healthcare courses and the findings indicate an improvement in questionnaire scores between first- and final-year students however the magnitude of change varied across the disciplines.

The mean scores from the HC-PAIRS and the BBQ are similar to those in previous studies [21,22,25-27,35]. The present findings suggest that final-year mental health nursing and physiotherapy students may have significantly more positive attitudes towards function in patients with persistent pain, when compared to their respective first-year peers. Specific curriculum components, such as the development of a particular model of clinical reasoning or the exposure to patients through placements, may have an influence on pain-related attitudes and beliefs over the course of their studies. Although the small effect sizes suggest that the year of study may only account for a low percentage of variance in questionnaire scores, the improvements are comparable to the findings of previous studies in physiotherapy and medical student populations [22,25,26]. These results strengthen the hypothesis that the level of study may influence the beliefs of healthcare students towards persistent pain.

Based on the ANOVA conducted, the significant effect of the Course variable on HC-PAIRS and BBQ scores indicates a variance of pain-related attitudes and beliefs across the different healthcare courses. Furthermore, the magnitude of change in BBQ scores between first- and final-year students was significantly different between the courses. This could suggest that some healthcare disciplines may have a more positive influence on persistent pain beliefs. Results from other studies suggest a similar trend, reporting that some disciplines (e.g. physiotherapy) may be more effective than others (e.g. nursing or pharmacy) in developing positive attitudes towards persistent pain [21,22,36].

In addition to showing the most improvement in questionnaire scores, it is interesting to note that first-year physiotherapy students mean scores were similar to those in final-year podiatry, child and mental health nursing. A potential avenue to explain this would be that students interested in becoming physiotherapists may have a pre-disposition to understanding and applying the biopsychosocial model or that they develop a biopsychosocial approach

through gaining work experience and understanding of the role of physiotherapists. However, this is yet to be explored.

Interestingly, the present BBQ scores suggest that there is a trend towards more negative beliefs about low back pain in final-year child and mental health nursing students, when compared to their respective first-year peers. Other studies report the lack of significant improvement between first- and final-year nursing students, or the tendency for nursing to score significantly lower than other healthcare disciplines [22,27,36-38].

Several course-related factors have the potential to influence the development of profession-specific attitudes and beliefs, as these can be shaped by socio-environmental interactions [39,40]. As all undergraduate healthcare students are required to complete at least a thousand hours in practice education, it raises the question of what makes a difference in the pain-related attitudes and beliefs. The seeming effectiveness of the physiotherapy course in improving these attitudes and beliefs may stem from a higher content of pain-related education [9] or an increasing trend towards a more biopsychosocial approach to treatment [41]. Due to the cross-sectional design of the current study the potential influence of these factors cannot be determined.

The short-term effect of time-efficient interventions on pain-related knowledge, attitudes and beliefs has been investigated. A randomised controlled trial investigated the effect of a 70-minute pain neurophysiology education (PNE) session in UK and Irish physiotherapy students, assessed by the HC-PAIRS **[**36]. This robust trial offers good-quality insight about the short-term benefits of a PNE session in physiotherapy students early in their studies. This intervention had an effect twice larger than the results from present and previous studies amongst first- and final-year healthcare students [25,26]. Another study found similar improvements in pain-related attitudes and beliefs following a 15-minute educational video on back pain amongst first-year undergraduate medical students [35]. The intervention successfully improved mean BBQ scores by 6.1 points, assessed immediately after the intervention. However, these findings are contrasted by a recent study, where the HC-PAIRS scores did not change following a PNE session in first-year US physical therapy students [42]. The differences in study designs [35,36,42] and the lack of robust methodology resulting from the absence of blinding, randomisation, control or clinical exposure to patients [35,42] do not allow for a meaningful comparison. More importantly, these studies did not

assess the long-term effectiveness of the proposed interventions. It is currently unknown how the short-term improvements in attitudes and beliefs would carry over following graduation and translate to clinical practice.

The current evidence and the present findings consistently suggest that undergraduate healthcare courses may help students to develop more positive attitudes and beliefs towards persistent pain management, leading to improved HC-PAIRS and BBQ scores. Additionally, some specific disciplines may have a significantly more positive influence than others. Brief educational interventions could be used to complement undergraduate healthcare education, with the aim to enhance pain management in the long-term. Based on the strong construct validity of the questionnaires used, these improvements in HC-PAIRS and BBQ scores are likely to reflect a shift towards a more biopsychosocial approach to pain management, in line with the current guidelines [11,12,14-16,30,32,33].

Limitations

Several limitations may impact the quality of evidence generated by these results. Firstly, the use of a cross-sectional design generates a potential threat to the internal validity of the study. The findings could be due to fundamental differences between the participants and no causal relationship can be inferred from the results. Secondly, the high variability of data collected decreases the internal validity of the results. This variability may be due to the cross-sectional design, the differences in sample size per course or the underpowered nature of the study. Nonetheless, this study offers complementary evidence about the potential differences between several undergraduate healthcare courses; similar findings are observed in the literature, which increases the ecological validity of the present findings. The sampling of different disciplines represents one strength of this study and allows a robust comparison across disciplines. It is acknowledged that being underpowered may represent a threat to the internal validity of this study. The use of convenience sampling may be another limitation and represents a threat to external validity; the differences in results might be unique to the population studied and may not be generalisable to other student populations. The completion rate varied between the courses, which might have skewed the results towards disciplines with a higher response rate, such as the physiotherapy course (Table 1). Nevertheless, the sample size and the results are consistent with the existing literature despite being underpowered.

Implications for Practice

Based on these limitations, a degree of caution should be applied when interpreting the present results. Overall, the scores reported in this study are similar to the existing literature; these combined results could therefore be used to shape the content of future undergraduate healthcare courses. The curriculum and the delivery methods of the courses demonstrating more positive beliefs could be analysed to determine potential ways to improve pain-related attitudes and beliefs. These adaptations could then be implemented within the entirety of the healthcare disciplines and adapted to the various professional identities, with the hope to yield similar results: to improve pain-related attitudes and beliefs, and enhance persistent pain management in the long-term.

The present lack of research concerning the transition of pain-related attitudes and beliefs of undergraduate students to a clinical context prevents a meaningful interpretation of these improvements in questionnaire scores. However, the findings of two recent systematic reviews suggest that clinicians' pain-related attitudes and beliefs may influence the treatment approach [11,12]. It could be argued that the final-year student population is relatively similar to recently-graduated clinicians. Therefore, enhancing pain-related knowledge, attitudes and beliefs in undergraduate healthcare students is likely to improve persistent pain management following graduation.

Conclusion

From the data presented and the available evidence, it is consistently suggested that undergraduate healthcare education may have a positive influence on pain-related attitudes and beliefs. Additionally, specific disciplines seem to demonstrate more positive outcomes than others. Based on the lack of pain-related education within the worldwide undergraduate curricula, it is vital to understand and maximise the long-term influence of undergraduate education on persistent pain management.

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1 Appendix 1
2
3 STROBE Guidelines – Checklist

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(*a*) *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy
		(*e*) Describe any sensitivity analyses

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7 Continued on next page
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Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
		(b) Give reasons for non-participation at each stage
		(c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time
		Case-control study—Report numbers in each exposure category, or summary measures of exposure
		Cross-sectional study—Report numbers of outcome events or summary measures
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

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Appendix 2

Participants Table – Response and completion rates

Contacted by email First and final year students						
Adult Nursing	Child Nursing	Mental Health Nursing	Occupational Therapy	Physiotherapy	Podiatry	Learning Disability Nursing
728	192	138	122	93	66	135
						
Started the survey First and final year students						
Adult Nursing	Child Nursing	Mental Health Nursing	Occupational Therapy	Physiotherapy	Podiatry	Learning Disability Nursing
23	24	24	53	60	11	2
3.16%	12.50%	17.39%	43.44%	64.52%	16.67%	1.48%
						
Completed the survey First and final year students						
Adult Nursing	Child Nursing	Mental Health Nursing	Occupational Therapy	Physiotherapy	Podiatry	Learning Disability Nursing
19-20	21-23	24	40	59-60	10-11	2
2.61% - 2.75%	10.94% - 11.98%	17.39%	32.79%	63.44% - 64.52%	15.15% - 16.67%	1.48%

Appendix 3

HC-PAIRS scores in the student population – Summary of the literature

HC-PAIRS Score Mean (SD)	Course	Number of Participants	Country	Reference
40.2 (8.7)	Physiotherapy	171	Australia	Briggs et al., 2013
44.8 (8.8)	Chiropractic	46		
46.2 (8.8)	Medicine	176		
49.7 (9.9)	Occupational Therapy	71		
52.9 (9.2)	Pharmacy	138		
54.2 (8.7)	Physiotherapy	179	Australia	Latimer, Maher & Refshauge, 2004
55 (9.4)		176		
50.9 (9.3)		118		
57.4 (9.4)	Physiotherapy	61	United-Kingdom	Ryan et al., 2010
65.3 (10.0)	Business	62		
56.4	Medical	146	United-Kingdom	Morris et al., 2012
65.3 (10.0)	Business	62		
62 (11.1)	Physiotherapy	170	Spain	Domenech, 2011
60.0 (9.3)	Physiotherapy	156	Australia, Singapore & Taiwan	Burnett et al., 2009
67.0 (8.2)	Nursing	226		
70.44 (9.63)	Physiotherapy	135	Saudi Arabia	Alshami & Albahrni, 2015

SD = Standard Deviation

HC-PAIRS = Health Care Providers' Pain and Impairment Relationship Scale

Appendix 4

BBQ scores in the student population – Summary of the literature

BBQ Score Mean (SD)	Course	Number of Participants	Country	Reference
37.5 (5.4)	Physiotherapy	171	Australia	Briggs et al., 2013
35.3 (4.9)	Chiropractic	46		
32.6 (5.3)	Medicine	176		
31.8 (4.8)	Occupational Therapy	71		
30.0 (5.7)	Pharmacy	138		
33.71 (6.58)	Physiotherapy	107	Ireland	Kennedy, Healy & O'Sullivan, 2014
31.08 (5.63)	Medicine	63		
26.56 (5.41)	Nursing	101		
30.7 (6.2)	Physiotherapy	156	Australia, Singapore & Taiwan	Burnett et al., 2009
27.3 (5.4)	Nursing	226		
30.4 (4.9)	Nursing	81	Australia	Mitchell et al., 2009
29.3 (5.6)		53		
28.9 (4.5)		36		
30.2 (5.3)	Nursing	31	Australia	Mitchell et al., 2010
30.0 (4.6)		76		

SD = Standard Deviation

BBQ = Back Beliefs Questionnaire